ORIGINAL ARTICLE

Common Cold—An Update

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Abstract

The common cold, a mild yet highly prevalent upper respiratory tract infection (URTI), imposes a substantial societal and economic burden through healthcare costs, lost productivity, and widespread morbidity. Primarily caused by diverse respiratory viruses (e.g., rhinoviruses, coronaviruses), it encompasses a spectrum of acute infections affecting the nasal passages, throat, larynx, and bronchi, manifesting as rhinitis, pharyngitis, or bronchitis. Framed by the "iceberg concept" of disease, most cases are mild or asymptomatic, yet severe outcomes (e.g., exacerbations of chronic conditions) contribute to rare mortality. Management focuses on symptom relief: decongestants and antihistamines alleviate nasal congestion and cough in adults, though cough suppressants are discouraged in children. Despite its self-limiting nature, the common cold underscores challenges in primary care due to viral diversity and a lack of targeted therapies. Annual influenza vaccination, while not preventing colds, mitigates flu-related complications, indirectly reducing overlapping URTI burdens. Public health strategies emphasizing prevention, symptom management, and judicious antibiotic use remain critical to curbing its widespread impact.

Keywords: Acute respiratory infections, ARI, Common cold, COVID-19, Influenza, Respiratory syncytial virus, Respiratory viral infections.

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Introduction

The common cold is caused by various viruses, typically characterized by a range of symptoms, including cough, rhinorrhea (runny nose), nasal congestion, and throat discomfort, and may also present with additional symptoms such as fever, myalgia (muscle ache), fatigue, headache, and diminished appetite.[1]

The common cold has a significant economic impact on healthcare expenditures and productivity losses. It is noteworthy that upper respiratory tract infections contribute significantly to temporary disability, resulting in absenteeism from work and educational institutions, along with symptoms that may be bothersome and fatigue that is often pronounced.

Its complex viral etiology, caused by multiple pathogens such as rhinoviruses, influenza, and other viruses presents challenges in developing effective treatments and vaccines. This is often inappropriately treated with antibiotics, contributing to the growing problem of antimicrobial resistance and underscoring the need for improved management strategies. Additionally, the common cold can exacerbate underlying conditions such as asthma and chronic obstructive pulmonary disease (COPD), and may increase the risk of more severe infections. It can predispose individuals to more severe lower respiratory illnesses, such as bronchiolitis or pneumonia, and, though uncommon, may even lead to fatal outcomes, represented metaphorically by the tip of the iceberg (Fig. 1).

The iceberg model pertinent to viral infections suggests that a substantial proportion of such infections manifest either asymptomatically or with mild clinical manifestations, insufficient in severity to elicit self-diagnosis as a common cold. These instances remain obscured, analogous to the submerged portion of an iceberg. In contrast, more severe clinical presentations may achieve a severity threshold justifying the classification of "influenza-like illness." Furthermore, lower respiratory tract infections, including but not limited to bronchiolitis and pneumonia, may frequently be misidentified due to their initial presentation resembling a common cold, thus complicating clinical recognition and management.

The discussion situates the common cold within the framework of the "iceberg concept" (Fig. 1) of disease to serve as an umbrella term (Fig. 2) with comprehensive designation for acute infections affecting the nasal passages, throat, larynx, and bronchi, causing rhinitis, rhinosinusitis, pharyngitis, laryngitis, and bronchitis.

The common cold plays a critical role in the exacerbation of bronchial asthma,[2] and other chronic respiratory diseases such as chronic obstructive pulmonary disease (COPD),[3] and interstitial lung disease like idiopathic pulmonary fibrosis (IPF).[4]

Epidemiology

The manifestation of the common cold exhibits a distinct seasonal pattern. The temporal patterns of viral pathogens traditionally associated with respiratory infections, specifically respiratory viruses and SARS-CoV-2, in the Northern Hemisphere during the post-COVID-19 epoch exhibit notable seasonality. While adenoviruses and human rhinoviruses exhibit persistent circulation and are etiological agents of respiratory infections throughout the calendar year, the temporal interval delineated between late autumn and early spring (specifically, from November to April) is posited to constitute

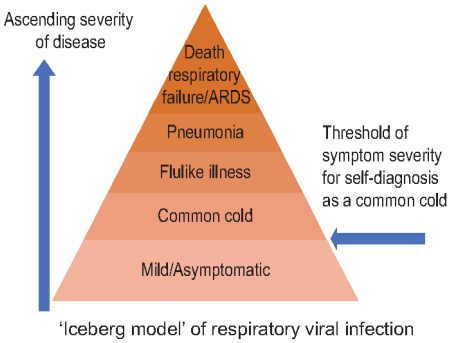

Fig. 1: The iceberg model pertinent to viral infections

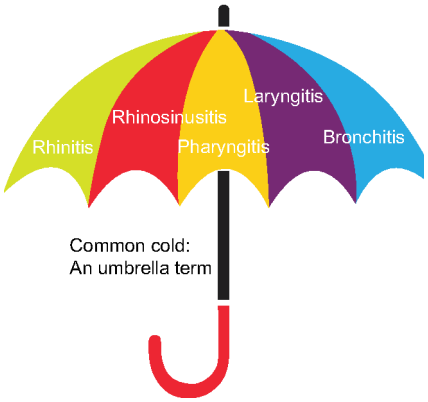

Fig. 2: The common cold serves as an umbrella term

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the winter respiratory season in the Northern Hemisphere. During this defined period, there is a marked augmentation in the activity levels of influenza viruses, respiratory syncytial virus (RSV), and human metapneumovirus (hMPV). Moreover, enteroviruses are observed to reach their peak of activity in late autumn. Although seasonal human coronaviruses (HCoV) can induce mild upper respiratory tract infections throughout the year, their activity is significantly heightened during the aforementioned winter respiratory season.[5] Adults typically experience a common cold approximately two to three times annually, while pediatric populations may encounter up to eight instances within the same year.[6,7] Additionally, during the early stages of life, males tend to present a higher respiratory infection frequency than females. Research indicates that women engaged in external employment tend to have a lower incidence of infections compared to their counterparts who primarily remain at home. The attendance of children at daycare facilities represents a significant risk factor for respiratory illnesses. This observation may be attributed to a higher level of exposure to children among those who do not participate in the workforce.[5]

Due to the significant involvement of rhinoviruses in the etiology of the common cold, its epidemiological patterns are closely aligned with those of rhinovirus infections. While rhinoviruses can be identified year-round, the frequency is highest in autumn, followed by a more moderate resurgence in the spring.[8] Influenza epidemics generally arise during the winter months in the Northern Hemisphere, frequently coinciding with RSV.[9]

Respiratory viruses, particularly rhinovirus, spread indoors via two pathways: (1) indirect transmission through fomites (contaminated surfaces) or contact; (2) direct transmission via large respiratory droplets or airborne aerosols.[10]

Influenza viruses and other respiratory viruses are believed to be predominantly transmitted via small-particle aerosols (Fig. 3). In contrast, transmission of rhinoviruses is predominantly achieved through hand contact followed by self-inoculation into the nasal passages or eyes. Other determinants affecting the incidence of common cold infections are population overcrowding, increased stress levels, tobacco and alcohol consumption, age demographics, sleep quality, seasonal variations, exposure to cold temperatures, and low physical activity.[11] The pandemic resulting from SARS-CoV-2 has ushered in a transformative era in the research of respiratory viruses. It is noteworthy that, with the global increase in exposure to and immunity against SARS-CoV-2, there is a possibility that COVID-19 may evolve into a viral symptom that resembles those responsible for the common cold.[12]

Etiology

The designation "common cold" has been utilized for numerous centuries and is frequently linked to the notion that exposure to lower temperatures induces the manifestation of disease symptoms. It was not until the groundbreaking research conducted around 1950 that respiratory viruses, including rhinoviruses, were identified as a causative factor.[13] The pathogens implicated in the common cold's etiology encompass various viruses, including: (1) rhinovirus, (2) respiratory syncytial virus, (3) parainfluenza virus, (4) adenovirus, (5) enterovirus, and (6) coronavirus. It is important to highlight that Rhinovirus, which is categorized within the *Enterovirus* genus of the Picornaviridae family, is recognized as the primary etiological factor in the manifestation of the common cold.[14] Among humans worldwide, accounting for up to 80% of respiratory infections observed during peak incidence periods.[15] The rhinovirus accounts for approximately 50% of cases of upper respiratory tract infections (URTI) and also in an otherwise. Even after 75 years of the discovery of Rhinovirus, the search for a definitive treatment for rhinovirus remains a topic of active research and exploration.[14] Additionally, various viral infections have the potential to produce similar symptoms and their characteristics, which are summarized in Table 1.

Clinical Manifestations

The common cold is characterized as "a mild, self-limiting upper respiratory tract infection" in a healthy person. The incubation period can significantly differ among various viral pathogens. In controlled experimental settings involving rhinovirus infections, it has been observed that symptoms may commence

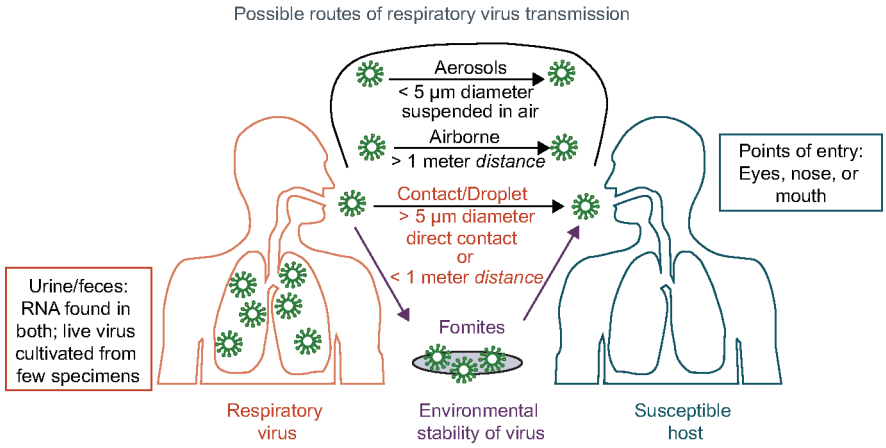

Fig. 3: Transmission of respiratory viruses via small-particle aerosols

Table 1: Respiratory viruses and their basic characteristics

Virus	*Abbreviation*	*Nucleic acid*	*Classification*	*Structure*
Rhinovirus	HRV	RNA	Species A, B, C, with 100 serotypes	Nonenveloped icosahedral capsid
Seasonal coronavirus	HCoV	RNA	Types OC43, 229E, NL63, HKU1	Enveloped
Pandemic coronavirus	SARS, MERS, SARS-CoV-2	RNA	Variants such as Alpha, Delta, Omicron	Enveloped
Respiratory syncytial virus	HRSV	RNA	Groups A and B	Enveloped
Parainfluenza virus	HPIV	RNA	Types 1, 2, 3, 4	Enveloped
Influenza virus	Inf	RNA	Types A, B, C, D	Enveloped
Adenovirus	ADV	DNA	51 serotypes	Nonenveloped icosahedral capsid
Human metapneumovirus	HMPV	RNA	Groups A and B	Enveloped
Human bocavirus	HBoV	DNA	2 lineages	Nonenveloped icosahedral capsid

as early as 10–12 hours after the intranasal administration of the virus. The incubation period for influenza viruses is usually 1–7 days, with early symptoms observed to increase rapidly, typically peaking in the subsequent 2–3 days following the onset of infection, and thereafter tends to diminish promptly. The average duration of the common cold symptoms is approximately 7–10 days; however, occasionally, individuals may continue to experience lingering symptoms for up to 3 weeks.[16]

Rhinovirus infections typically initiate with the presentation of a sore throat, which is shortly followed by symptoms such as nasal congestion, nasal discharge, sneezing, and coughing. Rhinitis caused by respiratory viral infections (e.g., the common cold) shares clinical features with allergic rhinitis, such as nasal congestion and rhinorrhea. However, their underlying mechanisms differ: allergic rhinitis symptoms (e.g., itching, sneezing) are primarily mediated by histamine,[17] prostaglandins, and bradykinin; viral rhinitis symptoms (e.g., pain, congestion).[18]

The discomfort associated with the sore throat generally resolves rapidly, while the initial watery nasal discharge may progress to a thicker and more purulent form. Notably, the increase in nasal purulence does not correlate with alterations in the nasopharyngeal bacterial flora nor indicate a concurrent bacterial infection of the nasal mucosa. Fever during rhinovirus infections in adults is relatively uncommon; however, it is a more frequent symptom in children experiencing upper respiratory infections from various etiologies. Additional symptoms of common cold syndrome may include headaches, general malaise, and lethargy. Although myalgia may be observed during colds, it is more characteristically associated with influenza infections.

The presence of numerous rhinovirus serotypes, coupled with their frequent antigenic variability, presents considerable challenges for identification, characterization, and potential eradication efforts. Following exposure to the anterior nasal mucosa, rhinovirus replication and subsequent infection are believed to initiate due to mucociliary transport to the posterior nasopharynx and adenoidal tissues. Symptoms may manifest as early as 12 hours postinoculation. The microbial invasion of the nasal epithelium, in conjunction with the host's innate immune-mediated inflammatory response, initiates a cascade of physiological phenomena characterized by the induction of vasodilation and an elevation in endothelial permeability within the vascular microenvironment, leading to nasal obstruction and rhinorrhea. Additionally, cholinergic stimulation contributes to increased mucus production and the occurrence of sneezing.

Influenza is frequently considered a distinct clinical entity, separate from the common cold. Nevertheless, the clinical manifestations of influenza can vary widely, ranging from asymptomatic cases to more severe illness, resulting in an overlap with the common cold. The underlying mechanisms of symptom manifestation related to the innate immune response are elucidated, and a summary of symptomatic treatment options is provided. Preferred symptomatic treatments should address the comprehensive resolution of all potential symptoms rather than focusing solely on treating an isolated symptom, such as mucus hypersecretion, in relation to the anticipated anatomical site, such as acute bronchitis.

A particular study involving adult asthma patients revealed that symptoms associated with the common cold were documented as wheezing or dyspnea in nearly 80% of cases, with rhinoviruses being identified as the causative agent in approximately 60% of these asthma exacerbations.[19]

In individuals exhibiting immunocompromised states, RSV is conventionally identified as the predominant etiological agent responsible for the manifestation of severe viral respiratory pathologies. Notwithstanding, pathologies associated with infections caused by rhinoviruses have been quantitatively correlated with severe lower respiratory tract diseases. Moreover, in infrequent circumstances, these pathological conditions may result in mortality. There are no officially recognized antiviral therapies available for human rhinoviruses (HRVs), and the approach to treatment continues to be primarily supportive in nature. Symptoms of the common cold are shown in Figure 4.

The common risk factors for the common cold are described in Figure 5.

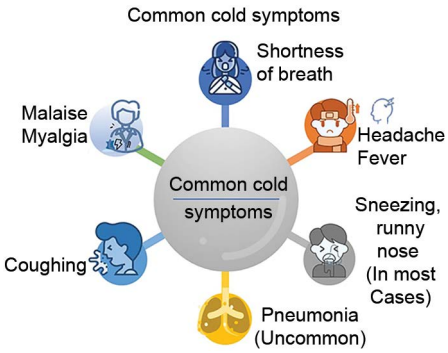

Fig. 4: Symptoms of the common cold

Evaluation and Diagnosis

The identification of classical indicators associated with rhinovirus infection, in conjunction with the lack of evidence for bacterial infection or severe respiratory conditions, provides a foundation for diagnosing the common cold, primarily a clinical diagnosis, thus eliminating the necessity for diagnostic testing. In the context of influenza testing, it is advisable to collect specimens as soon as symptoms begin to manifest. For infants and young children, it is advisable to collect nasal aspirates or swabs as the most suitable specimens. In contrast, nasopharyngeal swabs and aspirates are recommended for older children and adults. Furthermore, the use of rapid streptococcal swabs may be beneficial in ruling out bacterial pharyngitis, which can help decrease the number of antibiotic prescriptions associated with these infections.

Laboratory Diagnosis

Reverse transcription polymerase chain reaction (RT-PCR) serves as a cornerstone for respiratory virus detection, offering high sensitivity and specificity. The emergence of multiplex PCR panels has further expanded diagnostic capabilities

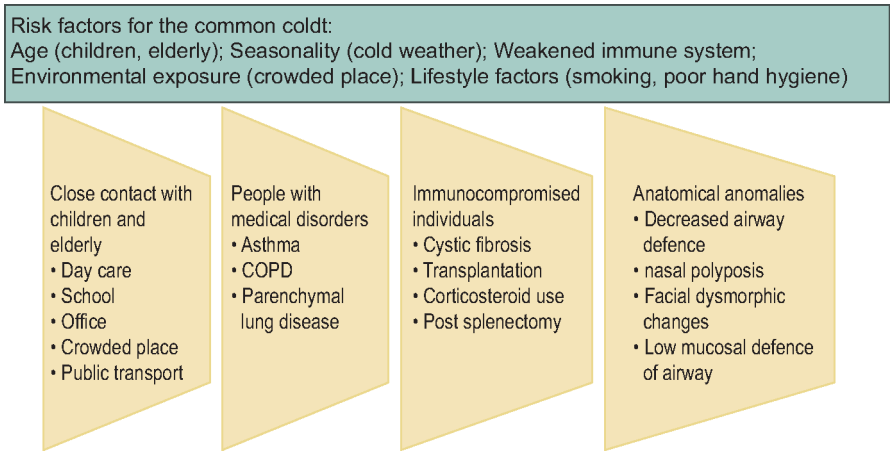

Fig. 5: The common risk factors for the common cold

by enabling simultaneous testing for a broad range of respiratory viral pathogens, including influenza A and B, RSV A and B, parainfluenza viruses 1–4, adenovirus, rhinovirus/enterovirus (RV/EV), human metapneumovirus (HMPV), coronaviruses (including seasonal variants and SARS-CoV-2), and others.[20]

Differential Diagnosis of the Common Cold

Distinguishing the common cold from other conditions with overlapping symptoms is essential to avoid misdiagnosis and ensure appropriate treatment. Influenza (flu) is marked by sudden onset, high fever, severe body aches, and exhaustion, contrasting with the cold's mild, localized symptoms. Allergic rhinitis mimics cold symptoms but includes itching (eyes/nose), clear nasal discharge, and seasonal triggers, with no fever or mild fever. COVID-19 may present with varying symptoms, including anosmia (loss of smell), dyspnea, gastrointestinal symptoms, severe respiratory infection, and bilateral pneumonia, necessitating PCR/antigen testing for confirmation. Bacterial sinusitis is suspected if symptoms persist beyond 10 days and are accompanied by purulent nasal discharge and facial pain. Streptococcal sore throat features severe sore throat, fever, and tonsillar exudate but lacks cough or nasal congestion. RSV in children often causes wheezing and respiratory distress, while pertussis (whooping cough) is distinguished by paroxysmal coughing fits and post-tussive vomiting. GERD/laryngopharyngeal reflux can mimic colds with chronic cough and hoarseness, but lacks nasal symptoms and improves with antacid therapy. Clinicians should assess symptom duration, exposure history, and red flags (e.g., high fever, dyspnea) and use targeted testing (e.g., rapid strep, imaging) when needed. Accurate differentiation ensures timely intervention, preventing complications from overlooked conditions such as the flu or COVID-19.

Complications

Complications from URTIs are rare except in influenza, which can lead to viral pneumonia, secondary bacterial pneumonia, sinusitis, acute otitis media, opportunistic infections, and exacerbations of asthma/COPD. Pneumonia is a common complication of the flu in children.[11]

While the common cold is typically self-limiting, bacterial complications such as acute otitis media occur in nearly 20% of pediatric cases, peaking 3–4 days postsymptom onset. Risk factors for colds include population density, stress, smoking, immune status, age, and environmental factors.

Bacterial sequelae such as sinusitis (0.5–2% of viral rhinitis cases) and pneumonia may follow viral URTIs. However, sinus abnormalities observed during infections might reflect the viral course rather than bacterial complications. Post-viral pneumonia often stems from bacterial coinfections or direct viral spread, with viral-bacterial coinfections notably prevalent in children.

Management

The primary objective of managing the common cold is to alleviate symptoms. In adults, decongestants, combined with antihistamine and decongestant medications, have been demonstrated to alleviate cough, nasal congestion, and various other manifestations associated with the common cold. However, it is strongly advised to avoid cough formulations for children.[21] H1-receptor antagonists may slightly reduce rhinorrhea and sneezing during the initial days of a cold, particularly in adults.[22] Furthermore, it is important to inform patients that first-generation antihistamines may have sedative effects, warranting caution with their use. Current evidence does not support antihistamines to treat non-allergic common cold symptoms. While they may only mildly reduce overall symptom severity within the first 48 hours, their routine use is not advised.[23]

Both locally administered and systemically administered nasal decongestants, exemplified by topical oxymetazoline and orally ingested pseudoephedrine, have exhibited a statistically significant reduction in nasal airway resistance in the adult and adolescent populations, as quantified through controlled clinical trials and pharmacodynamic assessments.[22] However, current evidence does not strongly support repeated nasal decongestant use, though single doses may offer mild short-term relief of nasal congestion in adults with colds.[24] Except in allergic rhinitis, intranasal corticosteroids (like Fluticasone Furoate), current evidence does not endorse the utilization of intranasal corticosteroids to alleviate symptoms associated with the common cold.[25]

Additionally, evidence-based research indicates that the administration of antibacterial agents is against the therapeutic management of the prevalent URI in the common cold, as such pharmacological interventions fail to provide statistically significant amelioration of symptomatology or to abbreviate the temporal course of the ailment. Evidence confirms that antibiotics provide no therapeutic benefit for treating the common cold or persistent acute purulent rhinitis in any age group and pose risks of adverse effects.[26] Routine use is not recommended.[26] Furthermore, their inappropriate use may contribute to the emergence and proliferation of antimicrobial resistance.[22]

Several cough formulations show potential effectiveness, including dextromethorphan, bisolvon, and guaifenesin for cough relief and antihistamine-decongestant combinations that address a broad spectrum of symptoms.[27] A single dose of syrup comprising dextromethorphan hydrobromide, paracetamol, doxylamine succinate, and ephedrine sulfate effectively illustrates its utility as a convenient therapeutic option for alleviating symptoms such as nasal congestion, rhinorrhea, cough, and body aches commonly associated with the common cold. Furthermore, it also contributes positively to enhancing sleep quality, which may be impaired due to the presence of cold symptoms.[28]

Nonsteroidal anti-inflammatory drugs (NSAIDs) exhibit some efficacy in alleviating discomfort such as myalgia and fever associated with the common cold; however, there is no evidence of their effectiveness in reducing respiratory symptoms.[29]

A Cochrane Review[30] indicates that the prophylactic use of vitamin C at doses of 0.2 grams or more daily yields a "modest but consistent effect" on the period extent and intensity of rhinological manifestations. Nevertheless, therapeutic administration post-manifestation of clinical symptoms, higher-dose ascorbic acid, failed to exhibit statistically significant advantages in controlled clinical trials.[30] Zinc supplementation may exhibit minimal to no impact on the prevention of colds; however, it has the potential to decrease the duration of existing colds, albeit with a corresponding rise in the incidence of non-serious adverse events.[31] There is no evidence of benefits or harms associated with administering heated, humidified air delivered through a humidification system in treating the common cold.[32]

Timely antiviral tablets specific for influenza significantly reduce the duration and severity of symptoms, shorten hospital stays, and mitigate the risk of complications. The antiviral treatments should be administered as early as 48 hours after symptom onset for influenza, but may still be beneficial even shortly after 48 hours in pregnant individuals or in patients at high risk.[33]

Antiviral chemoprophylaxis presents an additional preventive measure, demonstrating efficacy rates between 70% and 90%, and

should be considered along with vaccination. In general, the administration of antiviral chemoprophylaxis is recommended during the initial manifestation of elevated influenza activity indicators for the following categories: (1) individuals classified as high-risk who are ineligible for vaccination on account of medical contraindications or for whom the recent immunization may not elicit an adequate serological response; (2) the mitigation of influenza outbreaks within populations of high-risk individuals located in institutional environments; and (3) individuals identified as high-risk who have exposure to the influenza virus.[34]

Patients should be advised to ensure sufficient fluid intake to achieve optimal hydration levels, prioritize periods of rest and recuperation, completely refrain from the inhalation of tobacco products, and rigorously comply with the established therapeutic protocols as delineated in their prescribed treatment regimens.[11,35]

Vaccine

Annual influenza vaccination (updated quadrivalent) is a critical preventive measure to reduce infection risk, severity, and complications of the flu. It is especially recommended for high-risk groups, including the elderly, young children, pregnant individuals, and those with chronic conditions (e.g., asthma, COPD). The vaccine is updated yearly to match circulating viral strains, enhancing efficacy. Vaccination lowers hospitalization rates, mitigates viral spread through herd immunity, and prevents secondary bacterial infections like pneumonia.

The SARS-CoV-2 pandemic has significantly heightened interest in vaccine research. The RNA vaccines developed in response to COVID-19 may serve as a valuable technological foundation for the advancement of vaccines targeting other RNA respiratory viruses, including rhinoviruses.[11] Despite significant epidemiological implications of human rhinovirus, a licensed vaccine is yet to be available.[36] The RSV virion is enveloped by a lipid membrane containing glycoproteins G and F, which mediate viral attachment and fusion to respiratory epithelial cells. These glycoproteins, particularly the highly conserved antigenic sites on the F-glycoprotein, are critical targets for therapeutic development. Monoclonal antibodies (mAbs) against RSV, such as nirsevimab, exploit these conserved regions to neutralize the virus.

Recent advancements have led to the approval of three novel RSV vaccines: two recombinant protein subunit vaccines (e.g., Arexvy, Abrysvo) and one mRNA-based vaccine (e.g., mRNA-1345). All are licensed for older adults (≥60 years), with one subunit vaccine (Abrysvo) additionally approved for maternal immunization to protect infants through passive antibody transfer.[37] Population-based evaluations of newly implemented vaccination programs yield substantial real-world evidence for the assessment of vaccines following their licensure. A comprehensive analysis conducted in the years 2023 to 2024 on vaccine effectiveness among immunocompetent adults aged 60 years and above in the United States demonstrated an 80% efficacy (95% CI: 71–85) in reducing hospital admissions related to RSV.[38] Barring occasional scenarios, SARS-CoV-2 is expected to evolve toward milder forms—though the pace of this transition remains unclear. Historical patterns from influenza pandemics suggest COVID-19 may take approximately 20 years to attenuate to the level of the common cold.[39]

Optimizing Collaborative Results within Healthcare Teams

A primary objective is to mitigate the overprescription of antibiotics while ensuring that serious infections are not overlooked. Primary care physicians and nurses assessing these patients are encouraged to engage in open communication with infectious disease specialists when uncertainty regarding the infection's severity arises. Additionally, pharmacists should educate patients regarding upper respiratory infections and advise against the excessive use of unproven remedies.[11]

Finally, clinicians should advocate for patients to receive the latest strains of vaccinations prior to the onset of the flu season. Notwithstanding the potential lack of efficacy in reducing the temporal extent of infectious episodes, the administration of the vaccine in the future is likely to bring a significant decline in symptom severity. In summary, the prognosis for most patients is favorable, particularly when approached through a collaborative interprofessional model.

Summary Points on the Common Cold

The common cold is primarily caused by rhinoviruses, though other viruses such as coronaviruses, influenza virus and RSV can also contribute. Many viral strains are linked to colds. The virus spreads through respiratory droplets (sneezing/coughing), direct contact with infected individuals, or touching contaminated surfaces (fomites). Symptoms include runny/stuffy nose, sneezing, sore throat, cough, mild fatigue, and occasional low-grade fever. Typically resolves within 7–10 days, though some symptoms (e.g., cough) may linger longer. The treatment focuses on symptom relief. Rest, hydration, over-the-counter medications (decongestants, pain relievers), and saline nasal sprays are commonly used. Antibiotics are ineffective as colds are viral. Emphasize hand hygiene, avoiding touching the face, disinfecting surfaces, and steering clear of close contact with infected individuals. No vaccine (except for annual influenza vaccination) exists due to the vast number of causative viruses.

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